EOS-AM PROJECT

SPECIFICATION FOR THE MODERATE-RESOLUTION IMAGING SPECTRORADIOMETER (MODIS) INSTRUMENT

GSFC 422-20-02, REVISION A, MARCH 24, 1993

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06/24/96

DOCUMENT CHANGE NOTICE

1. ORIGINATOR NAME AND ADDRESS	2. APPROVED DATE	4. DOCUMENT NO.
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6. SYSTEM DESIGNATION	7. RELATED CCR NO.	8. CONTRACT NO.	9. CONTRACTUAL ACTIVITY
MODIS Instrument	CCR 421-12-14-054	NAS5-30800	

10. CONFIGURATION ITEM NOMENCLATURE	11. EFFECTIVITY
Specification for the MODIS Instrument	

THIS NOTICE INFORMS RECIPIENTS THAT THE DOCUMENT IDENTIFIED BY THE NUMBER (AND REVISION LETTER) SHOWN IN BLOCK 4 HAS BEEN CHANGED. THE PAGES CHANGED BY THIS DCN BEING THOSE FURNISHED HEREWITH AND CARRYING THE SAME DATE AS THIS DCN. THE PAGES OF THE PAGE NUMBERS AND DATES LISTED BELOW IN THE SUMMARY OF CHANGED PAGES, COMBINED WITH NON-LISTED PAGES OF THE ORIGINAL ISSUE OF THE REVISION SHOWN IN BLOCK 4, CONSTITUTE THE CURRENT VERSION OF THIS DOCUMENT.

12. DOCUMENT	13. PAGES CHANGED (INDICATE DELETIONS)	*S	*A	14. DATE
422-20-02 Revision A	Pages iii-a, iv, and page 6-1	X		06/05/96

Pages 6-2 through 6-4 were affected by this change due to repagination.

15. TECHNICAL CONCURRENCE

Kenneth Anderson

DATE 24 Jun 96

CHANGE RECORD PAGE

DOCUMENT TITLE: Specification for the Moderate-Resolution Imaging Spectroradiometer (MODIS)

DOCUMENT DATE: March 24, 1993

ISSUE	DATE	PAGES AFFECTED	DESCRIPTION
CH-17	03/24/93	All pages affected	Approved by CCR 421-12-14-002
Rev. A	03/24/93	All pages affected	
CH-01	03/04/93	Pages iii-a, iv, and page 3-5	Approved by CCR 421-12-14-001
CH-02	05/06/93	Pages iii-a, iv, viii, 6-1, 6-2, and page 6-3	Approved by CCR 421-12-14-004
CH-03	05/06/93	Pages iii-a, iv, 3-3, and page 3-21	Approved by CCR 421-12-14-005
CH-04	05/06/93	Pages iii-a, iv, and page 6-4	Approved by CCR 421-12-14-006
CH-05	05/06/93	Pages iii-a, iv, and page 3-22	Approved by CCR 421-12-14-007
CH-06	11/04/93	Pages iii-a, iv, viii, and page 7-1	Approved by CCR 421-12-14-016
CH-07	03/10/94	Pages iii-a, iv, and page 6-1	Approved by CCR 421-12-14-021
CH-08	05/26/94	Pages iii-a, iv, and page 3-3	Approved by CCR 421-12-14-024-R1
CH-09	05/26/94	Pages iii-a, iv, viii, and page 6-4	Approved by CCR 421-12-14-015-R2
CH-10	01/30/95	Pages iii-a, iv, viii, and page 7-1	Approved by CCR 421-12-14-032 and CCR 421-12-14-034-R1
CH-11	10/13/95	Pages iii-a, iv, 2-2, and page 3-8	Approved by CCR 421-12-14-044
CH-12	10/13/95	Pages iii-a, iv, viii, and page 7-1	Approved by CCR 421-12-14-047
CH-13	10/27/95	Pages iii-a, iv, and page 3-1	Approved by CCR 421-12-14-046
CH-14	06/05/96	Pages iii-a, iv, and page 6-1	Approved by CCR 421-12-14-054

EOS 420-CM-05 (4/92)

DOCUMENT TITLE:
Specification for the Moderate-Resolution Imaging Spectroradiometer (MODIS), EOS-AM

RELEASE DATE:
March 24, 1993

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EOS 420-CM-04 (4/92)

6.0 GROUND SUPPORT EQUIPMENT REQUIREMENTS

6.1 GENERAL

The contractor shall provide and maintain the MODIS Ground Support Equipment (GSE) throughout the duration of the contract. The GSE consists of the System Test Equipment including image processors and reproducers, the GSE software, calibration equipment, shipping containers, expendable materials and other necessary equipment and fixturing required to operate, test, calibrate, maintain the MODIS in a contamination-free environment and to support instrument-to-spacecraft integration and cross-calibration during spacecraft system level testing. The contractor shall perform tests necessary to demonstrate that all GSE is functioning properly and within specification. Some GSE will also be used by the contractor to support in-flight performance verification activities.

6.2 DELETED

6.3 SYSTEM TEST EQUIPMENT

6.3.1 General

The System Test Equipment (STE) shall be able to operate the MODIS during all testing at the instrument contractor's facility. The STE shall be capable of interfacing with the EOS platform GSE. The STE shall be capable of recording all instrument data received from the MODIS and of performing performance analyses of the data. It shall also perform off-line analyses of MODIS data contained on history "tapes".

There shall be two sets of STE. They shall be functionally identical except that differences associated with the ability to control external calibration sources or devices are permissable. These differences shall not affect the interchangeability of the remainder of the two sets of STE. Any differences between sets shall be approved by the Technical Officer. One set shall be delivered to the spacecraft contractor's facility at the time the first flight instrument is delivered. This set will follow the spacecraft to the WSMC. This set will be used to perform functional and operational checks of a MODIS when it is either on the bench or on the spacecraft and support instrument cross-calibration activities on the spacecraft. This set shall provide the capability to capture and archive at least 19 minutes of continuous MODIS high-rate data. In addition, total storage capacity of at least 200 Gbytes shall be provided. The other set shall remain at the contractor's facility throughout the program. Calibration sources shall also be delivered with one set of STE CH-07 CH-07 CH-07 CH-07 CH-07 CH-14 CH-07 CH-07

for MODIS tests and calibrations at the spacecraft contractor's facility.

6.3.2 STE Requirements

(1) The STE shall be designed to duplicate as closely as possible all interfaces normally supplied by the spacecraft. The contractor shall provide the spacecraft electrical interface hardware in accordance with design information provided by the spacecraft contractor. The contractor shall provide test points for monitoring all spacecraft related signals.

(2) The STE shall include automatic data processing equipment. The equipment shall, as a minimum, be capable of generating self test programs, execute command verification and sending programs, prevent instrument damage, monitor complete instrument command status, perform limit checks, record special data, and perform engineering analyses (e.g., band signal-to-noise analyses) of the MODIS radiometric data. Any recorded data shall be appropriately formatted and annotated so that it is readily accessible when needed either at the contractor's facility or elsewhere. The STE shall maintain a record of total running time on each instrument model in each mode of operation.

The recording media and format shall be mutually agreed upon by the contractor and the Technical Officer.

(3) STE operation shall be generally transparent to whether the instrument is alone or mounted on the spacecraft.

(4) The STE shall include all cabling necessary to carry out the required activities with MODIS. Breakout boxes shall be provided to check out each electrical interface.

(5) The STE shall have the capability of producing multispectral (false color) images on a monitor screen of any one, two, or three spectral bands, and of producing hard copy monochrome images of any one band.

(6) The STE shall have the capability of making a paper hard copy of instrument raw data, specially formatted instrument data and all other information which can be written on a storage medium.

(7) The STE shall provide a means of decommutating any word in the MODIS output data stream and displaying the total decimal count and its identification in

arabic numerals as a continuous print. Status indicators and status bits shall be decommutated in real time and clearly displayed on the STE console.

(8) At least one set of the STE shall interface with ancillary test equipment including the standard radiance and irradiance sources. All essential data from this external equipment shall be automatically integrated with the instrument data for correlation with instrument radiometric data. | CH-02

(9) The STE shall provide test points for all significant MODIS and STE voltages and signals that are required to assess the operational health of each system.

(10) The STE shall include instrument data simulation for self-testing.

(11) The contractor shall maintain each STE, including the automatic data system and software, until the end of the contract, including any storage periods.

(12) Performance and ground calibration data shall be analyzed and displayed in near real time and in a quickly understandable form. This form shall generally be plots in engineering units.

6.3.3 Calibration Equipment and GSE Software

The calibration equipment and GSE software requirements are addressed elsewhere in this specification.

6.3.4 Shipping Container

The contractor shall provide environmentally controlled shipping containers and necessary ancillary equipment, in quantities to permit safe transport or storage of each instrument model.

Each shipping container shall be a suitable storage container and carrying case for each instrument. The container shall be capable of being pressurized with dry nitrogen and shall include shock protection, shock recorders, and temperature and humidity recorders. The container shall be designed to protect the instrument (a) in storage and (b) in transit via air freight and truck. The quantity of shipping containers required shall be determined by the contractor.

6.4 EQUIPMENT FOR AMBIENT OPERATION

Equipment as needed shall be provided to permit ambient (in-air) operation of the instrument with any cooled zones at their proper operating temperature. Provision shall be

made to prevent water, ice or contamination from forming on the instrument during such tests.

6.5 ANCILLARY EQUIPMENT

6.5.1 Drill Template

The spacecraft contractor will provide a drill template to MODIS and this template shall be used for drilling the mounting holes in all physical models of MODIS. This template shall be returned to NASA for use in drilling the spacecraft interface. CH-04

6.5.2 Handling and Lifting Fixtures

The contractor shall provide removable handling and lifting fixtures for the MODIS instruments, in accordance with NHB 6000.1C. These fixtures shall be designed to permit handling during assembly, test, shipment, and spacecraft integration operations. An appropriate set of these fixtures shall be shipped with the instrument as required for supporting tests and spacecraft integration at the spacecraft contractor's facility. The quantity of such fixtures shall be sufficient to permit necessary activities of all MODIS models to proceed without delay. The contractor shall provide additional handling equipment as necessary.

6.5.3 Spacecraft Interface Simulator

The spacecraft contractor will provide a Spacecraft Interface Simulator (SIS) for use in confirming the spacecraft to instrument interface. The MODIS contractor shall provide the cabling and other interface hardware between the SIS and MODIS. The MODIS contractor shall perform interface testing using the SIS and shall prepare and provide a test report summarizing the results of this testing. The spacecraft contractor will provide the necessary personnel to operate the SIS. The SIS shall as a minimum be used to confirm the interface of the EM and PFM. The time and duration of such testing shalpl be as mutually agreed between the spacecraft and MODIS contractors. CH-09